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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,847	01/13/2005	David Henry	264353US6PCT	8636
22850 7590 04/10/2007 OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER MENDEZ, ZULMARIAM	
			ART UNIT	PAPER NUMBER
			1709	
SHORTENED STATUTORY PERIOD OF RESPONSE		NOTIFICATION DATE	DELIVERY MODE	
3 MONTHS		04/10/2007	ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/10/2007.

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patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

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Office Action Summary	Application No. 10/519,847	Applicant(s) HENRY ET AL.	
	Examiner Zulmariam Mendez	Art Unit 1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 15-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>01/31/2005</u> . | 6) <input type="checkbox"/> Other: ____ |

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DETAILED ACTION

Claim Objections

1. Claim 16 is objected to because of the following informalities: claim 16 must be recited as dependent of claim 15 instead of 14 since claims 1 through 14 were canceled after the amendments. Appropriate correction is required.

For examination purposes, claim 16 has been treated as being dependent upon claim 15.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 15, 16, 22-24, 26, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos et al. (US 5,516,412) in view of Hemsley et al. (US 5,486,272) and further in view of Fleischmann et al. (US 3,856,652).

Regarding claim 15, Andricacos discloses a removable rack/slice (18) for supporting an article/part (14) to be coated with an armature for supporting and clamping the slice (See figure 5). However, fails to teach an electrolytic reactor comprising a conical chamber open at two opposite ends; an anode placed in the chamber, towards a wide and narrow end respectively; and means for circulating the electrolyte through the chamber from the narrow to the wide end, wherein the chamber includes stacked slices.

Hemsley teaches an electroplating apparatus comprising a reactor (20) having a conical chamber open at two ends (inlet and outlet ducts, 140 and 96, respectively) in order to evenly distribute the inflowing feedstock through the annular gap; an anode (70) placed in the chamber, towards a wide and narrow end respectively; and means, a pump (15), for circulating the electrolyte through the chamber from the narrow to the wide end (See figure 1).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use the electroplating apparatus having a conical chamber, an anode placed in the chamber and a pump, as disclosed by Hemsley, with the removable slices for the support of the element to be electroplated of Andricacos in order to evenly distribute the inflowing recirculated electrolyte through the chamber. However, Hemsley fails to teach a chamber including stacked slices.

Fleischmann discloses an electrochemical cell having a reactor containing 13 stacked graphite rods in order to form the physical structure of the reactor (col. 7, lines 30-35).

Therefore, one having ordinary skill in the art would have been motivated to provide the stacked graphite rods of Fleischmann to the modified Andricacos in order to form the physical structure of the reactor chamber.

Regarding claim 16, the rack/slice (18) as taught by Andricacos contains at least a cavity in which the support can be placed (see figure 1).

Regarding claim 22, Andricacos discloses a support (18) of the part comprising a housing with a periphery and depth adjusted to the part (14) as can be shown in fig. 1.

Regarding claim 23, the support of the part, as disclosed by Andricacos, is installed removable on an armature delimiting the chamber (inner chamber 12g, see figure1).

Regarding claim 24, the modified Andricacos fails to teach that the conical chamber, the support of the part to be coated, the part itself, and the anode are coaxial. However, Hemsley discloses that the part itself/cathode, and the anode are coaxial (col. 1, lines 54-56). Furthermore, the pump outlet is coaxial with the cathode tube (col. 3, lines 50-54) and it is clearly shown in figure 1 that the pump is coaxial with the chamber. Therefore, the anode, cathode and the chamber are coaxial to each other in order to allow the feedstock to pass through the annular gap formed between the concentric tubes. Hence, it would have been obvious to one having ordinary skill in the art at the time of the invention to use the coaxial arrangement of the chamber and the electrodes

of Hemsley in modified Andricacos, in order to allow the feedstock to pass through the annular gap formed between them.

Regarding claims 26 and 27, the slices/racks (18) of Andricacos are provided with individual extraction means and further comprising slides free to move in grooves of sidewalls of the tank and recessed above a slice to be extracted as shown in figure 5.

Regarding claim 28, Andricacos discloses the slices containing a part to be coated as described in claim 15 above but fails to teach that they further comprise at least three radiating anode support arm cavities. However, Hemsley discloses a reactor base having four axial holes (99) extending evenly around the central inlet duct (96) as can be shown in figure 4 in order to secure the anode (col. 6, lines 41-43). Therefore, one having ordinary skill in the art would have been motivated to use the structure of the reactor base, as taught by Hemsley, in the slices of Andricacos in order to secure the corresponding anode within its surface.

5. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos in view of Hemsley and Fleischmann, as applied above to claim 15, and further in view of Maekawa (US 6,547,951).

Regarding to claim 17, the modified Andricacos discloses the structure of claim 15 above, having a reactor with a uniform conical chamber but fails to disclose that the taper angle of the conical chamber is less than 20°. However, Maekawa teaches a conical truncated part for the radical generating zone/ reaction chamber as can be shown in figure 2. The side wall (2) of the truncated part (1) makes an angle of 5 to 40

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degrees with the axis or, namely, the center electrode rod (4) so that the cross sectional area of the flow channel is small at the intake of the top flat (3) of the truncated part and large at the bottom. It is preferable that the cross sectional area of the flow channel through the radical generating zone is expanded from the intake, i.e. the open top flat 3, toward the bottom of the truncated part thus to decrease the flow velocity of the inlet flow inversely proportionally to the cross sectional area (col. 4, lines 10-20).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use a conical chamber having a specified angle as taught by Maekawa in the modified Andricacos to create a small cross sectional area at the intake of the reaction chamber and a large one at the bottom in order to decrease the flow velocity of the inlet flow inversely proportionally to the cross sectional area.

Regarding to claim 18, Hemsley discloses an electrolyte reactor wherein circulating of the electrolyte is coaxial with the conical chamber within a tank containing a chamber (col. 3, lines 50-54), and comprising an electrolyte circuit looping back into the tank (see fig. 1).

6. Claims 19 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos in view of Hemsley, Fleischmann and Maekawa, as applied above to claim 18, and further in view of Iacovangelo et al. (US 6,365,016).

Regarding claim 19, the modified Andricacos teaches the structure as discussed above wherein the electrolyte circuit is connected to the narrow end of the reactor chamber by means of a valve (18) prolonging the chamber (see fig. 1), instead of a

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nozzle with a conical opening. However, Iacovangelo discloses a method for depositing a coating on a substrate. The chamber (11) containing the support for the part to be coated also contains a nozzle (18), which shape can be varied in order to optimize the extent of reaction, the coating area, and/or the thermal load on the substrate. The conical shape provides for a larger coating area onto the substrate (col. 8, lines 37-42).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to replace the valve of the modified Andricacos with the conical nozzle as taught by Iacovangelo in order to optimize the extent of reaction, the coating area, and/or thermal load on the substrate.

Regarding claim 25, Iacovangelo as disclosed above in claim 19 fails to teach that the nozzle also includes stacked and removable slices. However, the modified Andricacos, as described above in claim 15, discloses an electrolytic reactor comprising stacked and removable slices in order to form the structure of the chamber. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to add the slices as taught by the modified Andricacos in the nozzle of Iacovangelo in order to form and modify the nozzle's structure.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos in view of Hemsley and Fleischmann, as applied above to claim 15, and further in view of Bleck et al. (US 5,980,706).

Regarding claim 20, modified Andricacos fails to teach that the support of the part to be coated comprises electrical contacts for cathode polarization of the part

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arranged around the support and that include a free end pressed in contact on the part, and a connection end extending on a support face opposite the part. However, Bleck discloses an electrode semiconductor work-piece holder having a finger assembly electrical system/electrical contacts (824), which is utilized to effectuate an electrical bias to held a work-piece and supply electrical current relative thereto, including a free end pressed/ fingertip (854) in contact on the part, and a connection end extending on a support face opposite the part as can be shown in figures 16 and 20. The finger assembly includes a fingertip, which advantageously engages against a semiconductor work-piece (see FIG. 20) and assists in holding or fixing the position of the work-piece relative to work-piece holder 810. Furthermore, the fingertip also assists in providing an operative electrical connection between the finger assembly and a work-piece to which an electrical biased is to be applied and through which current can move (col. 17, lines 49-57).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to add the features as taught by Bleck in the support element of the modified Andricacos in order to effectuate an electrical bias to held a work-piece and supply electrical current relative thereto, assist in holding or fixing the position of the work-piece relative to work-piece holder and assist in providing an operative electrical connection between the finger assembly and a work-piece to which an electrical biased is to be applied and through which current can move.

8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos in view of Hemsley, Fleischmann and Bleck, as applied above to claim 20, and further in view of Herchen (US 7,087,144).

Regarding claim 21, the modified Andricacos fails to teach that the connection ends of the electrical contacts are connected to flexible arms of a star connector, fixed to a support by a mechanism with variable spacing, and wherein the support includes stops on which the flexible arms bend, and the electrical contacts are standing up on the flexible arms. However, Herchen discloses a contact assembly for supporting a substrate in an electrochemical plating system, wherein the contact assembly includes a thrust plate assembly and a contact ring, which includes an annular ring member having a plurality of flexible and conductive substrate contact fingers extending radially inward from the lower surface/star connector (abstract). The thrust plate pushes against the backside of the substrate to mechanically bias the substrate against the contacts, and during this process the pins that are in engagement with high spots on the substrate or the pins that are positioned higher (vertically) than other pins are caused to flex or bend downward. This downward motion allows for the remaining contact pins to also engage the substrate, and as such, all of the contact pins are brought into physical and electrical engagement with the substrate (col. 6, lines 43-52).

Therefore, one having ordinary skill in the art would have been motivated to use the flexible connector as taught by Herchen in the modified Andricacos in order to allow for optimal physical and electrical contact with the substrate.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zulmariam Mendez whose telephone number is 571-272-9805. The examiner can normally be reached on Monday-Thursday, 8:30am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ZM 3m


ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER